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AUTHOR Fitterman, L. Jeffrey
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ABSTRACT

Through developments with the use of the "Apple Macintosh" computer, "HyperCard," and "MacRecorder," children in preschool handicapped programs are now capable of participating in appropriate computerized learning experiences. "HyperCard" allows educators to produce their own computerized instructional lessons with a software program that integrates text, graphics, and sound. "MacRecorder" is a sound input device that allows recording and storing of digitized sounds; it has a built-in microphone, microphone jack, line jack, and an input level control knob. The delivery of presentations using these software products requires step-by-step organization through instructional software design. The design of a program called "MacMouse" is used to demonstrate application of the software design process, the "Macintosh" computer, "HyperCard" software, and the "MacRecorder" sound digitizer. "MacMouse" is an interactive tutorial to be used in a group situation with the teacher as the facilitator. It teaches awareness of facial parts, body parts, articles of clothing, and basic pre-kindergarten concepts. Provided are an outline of the steps in developing the "MacMouse" program, system requirements, curriculum considerations, and suggested opening scripts for lessons. (JDD)

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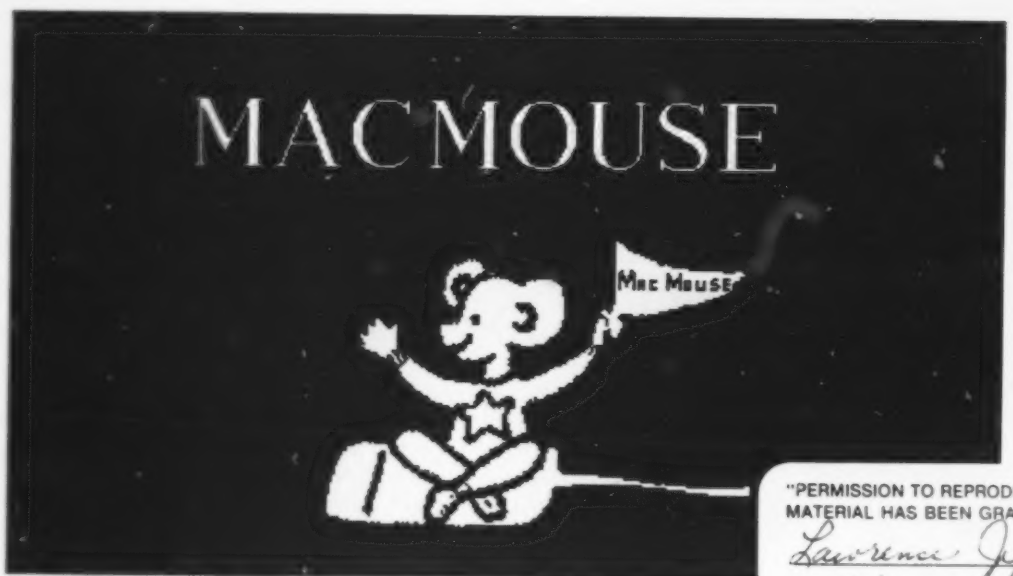
MACMOUSE

Developing Preschool Readiness Concepts and Skills with HyperCard® and MacRecorder®



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L. Jeffrey Fitterman, Ed.S.
Instructional Technology Specialist
Author of MacMouse©
Mary Ann Rodriguez, M.A.
Pre-K Specialist
Curriculum Considerations
Susan Watson, M.A.
Early Childhood Specialist
Consultant and Artist
Hillsborough County Public Schools
Department of Education for Exceptional Students
Florida Diagnostic and Learning Resources System
411 East Henderson Avenue, Room 105
Tampa, Florida 33602
(813)272-4555

INTRODUCTION

Early childhood educators who serve special needs children with physical, mental, sensory, behavioral or emotional disabilities are enthusiastic about the new developments with the use of the Apple Macintosh® and HyperCard®. Children in our preschool handicapped programs are now capable of participating in appropriate computerized learning experiences especially designed for them. The classroom teacher can easily computerize/adapt the presentation of individualized readiness concepts and skills that were before presented in a pencil and paper format. The computerized products are more vivid, dynamic and elicit an active participation by the students.

The contents of this paper will include an explanation of HyperCard, MacRecorder®, instructional software design, procedures for designing software products and the design of MacMouse.

WHAT IS HYPERCARD®

Think of HyperCard as an old time Nickelodeon. This machine consisted of pictures on individually indexed cards. These cards were positioned on a circular rolodex style wheel. The whole mechanism was then turned by means of a handle to produce an illusion of motion. Think of each indexed picture set or movie as a **stack** of related cards with pictures and writing. Now think of HyperCard in a similar fashion. Each developed program or stack is a series of related cards. These cards may be related to cards in the same or a different stacks. Each card can then be made into a direct replication of printed material. This card can pull from resources of sounds and other cards within and outside the primary stack.

How does HyperCard® lend itself to authoring.

HyperCard can be thought of as an authoring system allowing the user to easily integrate text, graphics and sound. HyperCard, like other Macintosh software, is a series of logical menus. It builds on the same skills necessary to run all Macintosh software. With just an introductory course, most educators can acquire the basic knowledge necessary to produce simple but meaningful stackware.

What does this mean for educators?

Educators have always dreamed of finding software that exactly fits the needs of the students and at an affordable price. Many of us have found out this is not always the case. We have thought,"If I only had the ability and resources to produce my own software". Software developers heard this call and produced authoring software such as PILOT®. One problem existed for the teacher. The program was just too time consuming in producing quality instructional lessons. Now, HyperCard® can fill this void allowing educators the ability to produce high quality software at a fraction of the time.

WHAT IS MACRECORDER®?

MacRecorder is a sound input device that allows you to record and store sounds when used with HyperCard or SoundEdit® applications. MacRecorder has a built-in microphone, microphone jack, line jack and an input level control knob.

What is the difference between synthesized and digitized speech/music?

Synthesized speech is characterized as robotic speech. An Echo II+® speech/music synthesizer is a good example of synthesized speech and music. The speech on a synthesizer is produced by modeling our phonetic speech patterns. These patterns are then interpreted into electronic circuitry.

Digitized speech and music is the actual reproduced speech and sound. Think of the computer as a cassette tape recorder and the diskette as a cassette tape. The computer converts/records your voice or music into digitized or numerical signals. These digitized or numerical signals are then recorded on to the magnetic recording surface of the diskette. This is very similar to the way cassette tape recorder operates. The result is high quality reproduced sounds that can be manipulated as if you were in a recording studio.

Why is digitized sound better for education?

The reason is quite clear. The digitized speech/music is more realistic because it is the actual recorded sound. There is no need to become acclimated to the sound. The sounds are not foreign to the listener because the sounds are produced as the listener expects them to be represented. A students can then listen to a computerized spelling quiz that has their teacher's voice.

INSTRUCTIONAL DESIGN

What is instructional design? Instructional design is the instructional organization behind the delivery of presentations or products. Before we as educators deliver a product, we organize the content into well thought out steps. Each step of the design builds on itself while checking for understanding by the student. Instructional design is not just for the teacher's presentation but for every presentation or product, whether delivered by human or machine.

What is instructional software design?

Instructional software design follows that same basic premise as instructional design. The premise is to produce a product that will generate the best understanding of the concept(s) by the student.

There are two added dimensions to instructional software design. We are restricted by the rules of operation of both the computer and the authoring software. Well constructed authoring software is simple but powerful and opens the full capacities of the computer to the user.

HyperCard was selected as our authoring software because it is simple, powerful and easily lends itself to the clear integration of text, graphics and sound. It allows the user to easily control the high capacities of the Macintosh. A user can quickly create a simple but well presented product with little initial investment in time. More importantly, it allows the user who is willing to go the extra mile the capabilities to produce commercial quality products.

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PROCEDURAL METHODS FOR DESIGNING THE SOFTWARE PRODUCT

Before we start developing a product there must be a need. We should research reference sources to see if a product is already available that meets our need. If the product does exist, we are ready for curriculum integration. If not, we are ready to proceed with our initial planning.

Initial planning

Once we have concluded that the software does not exist, we must define what the software is to accomplish. Is the program to test for, instruct on, or introduce a concept?

Our next step is to state the major goal for the software, i.e., "the software will present early childhood concepts on spatial relationships or the software will present early childhood concepts on body parts and clothing."

Next, we define our specific instructional objectives related to the major goal of the software. For example, "the student will learn the spatial relationships of over, under, right, left, etc."

At this point we need to research and assemble the curriculum content for the presentation or product. For example, many books and articles relative to our major goal exist. We initiate an ERIC search and build on the extensive expertise of our resource staff.

Now we are ready to create a storyboard, flowchart or sequential outline of how we want the information presented. Storyboarding is a method that is similar to the method cartoon movie makers use to design cartoons.

We create a rough picture of the computer screen including all text, graphics and denotations of sound. These pictures are put in sequential order of presentation. Notes are made at the bottom of each picture indicating what the teacher and student are to accomplish at this picture.

The designer manually goes through each picture in the sequence checking for positive correlation to goals and objectives; making sure that concepts are presented in a clear, correct and logical manner; making sure feedback is immediate and positive; and language is appropriate for level of students.

THE DESIGNING OF MACMOUSE

The need for this product came from a discussion of available software between the specialists for instructional technology and early childhood programs. The commercial software programs that are available were excellent except for two short comings. The short comings consisted of the use of synthesized speech and the cost. We concluded that we had the necessary hardware, software and expertise to produce similar software of our own design and at no additional cost. We elected to go with the Macintosh computer, HyperCard software and MacRecorder sound digitizer.

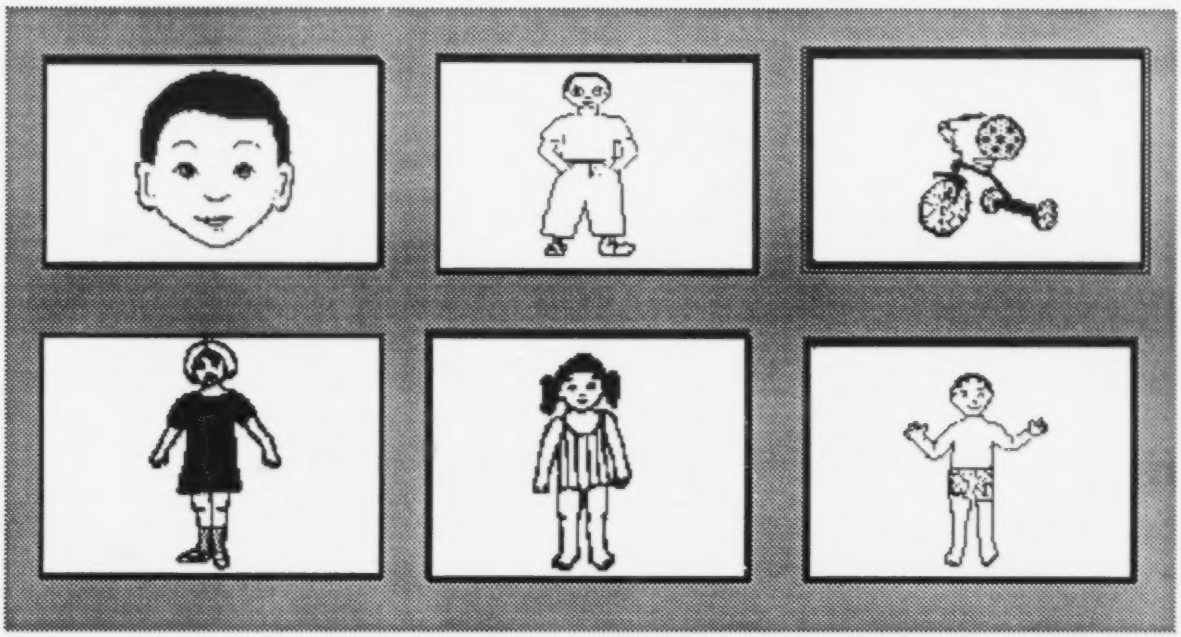
MacMouse has two components: the first, teaches the child to interact with the computer using the mouse and the recorded voice of the teacher instructing the child step by step to work through the lesson; the second, demonstrated how instruction can be individualized to teach the readiness skills appropriate for the preschools child's normal development.

The content of this program is taken from Boehm Concepts and body parts and clothing. However any appropriate concepts and content can be programmed by the teacher for the special needs of the children in the classroom.

Our major goal was to develop well presented interactive tutorials on the basic pre-kindergarten concepts. Our objectives consisted of the students' ability to name basic body parts, clothing, and spatial relationships taken from the Boehm Test of Basic Concepts. We then started listing the specific body parts, clothing and spatial relationships that we wished to first introduce.

We knew that the visual presentation of the concepts had to be representative of the cognitive level of the targeted students. We decided that the pictures were to be developed in house by our early childhood specialist to assure clarity. The pictures developed would have a high level of contrast/separation. We also planned for the inevitable: the colorization of the software with the release of the smaller Macintosh IIcx with a high resolution color monitor.

It was also our conclusion that the Macintosh computer and its operational environment would be in the future for special and regular education.



Program Development with HyperCard®

Because of the length of the narrative necessary to explain the actual programming process of MacMouse, we have listed only the main topic steps. Please understand that many subtopics occur under each main topic steps.

Steps:

A. Digitize hand drawn pictures.
B. Edit pictures with a paint program.
C. Design background card using HyperCard.
D. Paste pictures onto cards.
E. Final edit of cards.
F. Insert stack, background and card scripts. (See Scripts)
G. Create and place buttons.
H. Enter button scripts. (See Scripts)
I. Create text fields.
J. Enter field scripts. (See Scripts)
K. Create digitized voices/save as resource files using MacRecorder.
L. Edit digitized voices.
M. Save digitized voices.
N. Test stack
O. Revise stack
P. Compact stack
Q. Protect stack (write-protect and browse)

For the programmer, we have listed the HyperTalk scripting (coding) for the development of the MacMouse programs. You will notice that the degree of expertise necessary to produce high quality products is at an entry level.

A reference guide for HyperTalk is:
D. Goodman. The Complete HyperCard Handbook. Bantam. 1988.

Stack Scripting:

```
on openStack
  hide menuBar          (This script hides the menu bar and starts at)
  go card 1                    (card 1 on the opening of the stack)
end openStack
```

Card Scripting:

```
on Closecard
  repeat with x = 1 to the number of card fields
    hide card field x
  end repeat        (This script hides the fields upon leaving the)
end Closecard                  (the individual card)
```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Button Scripting:

```
on mouseUp
  play "hand"              (This script plays the recorded sounds and)
  show card field hand     (reveals the field by name)
end mouseUp
```

Field Scripting:

```
on mouseUp
  hide me                  (This script hides the field upon the pointing)
  end mouseUp              (and clicking the mouse)
```

DIRECTIONS FOR USING MACMOUSE

Purpose of MacMouse

MacMouse was designed as an interactive tutorial to be used in a group situation with the teacher as the facilitator. We do not suggest that the software be used independently by the student. This software will not only teach basic concepts but will be an excellent springboard to language development.

By pointing with the mouse and selecting a desired item, the computer presents both visually and auditorially the word associated with that item. We feel that children, even at an early age, should be aware of the association between written language and the representative object.

The students will also learn how to use a mouse or mouse emulation software/hardware.

System Requirements

You must have at least a Macintosh Plus with 1mb of RAM and HyperCard to utilize these programs. A Macintosh SE with 2mb of RAM and HyperCard is recommended. Check your control panel to make sure that the RAM cache is off and the speaker volume is at its highest level. An external and/or amplified speaker may also be necessary.

Installing MacMouse

MacMouse is made up of six 3.5" micro diskettes. For maximum benefit and ease of use we suggest that you use a hard drive.

Hard drive installation and operation

Create a folder within your HyperCard folder called "PREK". Copy all the files from the six micro diskettes into that folder. For information on how to create folders and copy files refer to your Apple Macintosh Owners Guide.

Double click on the MacMouse file called "PREK". After a brief introduction, the MacMouse menu will appear.

Two disk operation

Start your M.. :ntosh with your system diskette in the internal drive. If possible install HyperCard on a system diskette. Insert the MacMouse diskette of you choosing into your second drive. Open the diskette with the MacMouse application file. Double click on the MacMouse application file. This will also open HyperCard and then start the MacMouse application.

Note: You will not be able to functionally use the "Prek.menu" file unless you have a hard drive. Also, it will be very difficult to operate MacMouse efficiently with only one drive.

Using the MacMouse Menu

Select the MacMouse program you would like to use by clicking once on the program name.

Returning to the MacMouse menu

Return to the MacMouse menu from any MacMouse program by selecting the following icon of a man talking.

Using MacMouse "FACE"

FACE was designed to teach the awareness of facial parts. By pointing with the mouse and selecting a facial part the computer presents, both visually and auditorially, the word associated with that facial part. Follow the directions given auditorially as each facial part is selected.

<u>Suggested opening script for "FACE"</u>

Today we are going to learn about the parts of our face.
We are going to use a computer and the mouse to learn more about the parts our face.
Can anyone name a part of their face?
Would anyone like to use the mouse and point to the {facial part} on the boy's face? [repeat]

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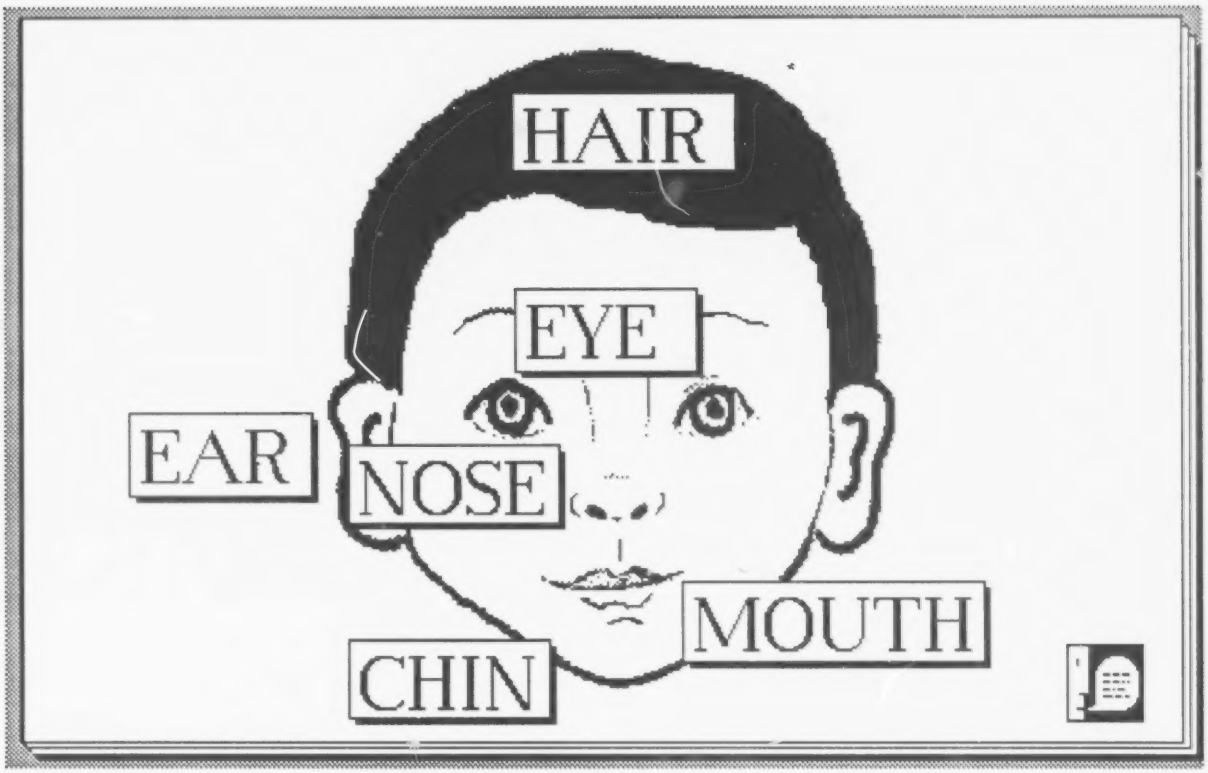

Using MacMouse "Body.boy or Body.girl"

Body.boy or body.girl were designed to teach the awareness of body parts. By pointing with the mouse and selecting a body part the computer presents, both visually and auditorially, the word associated with that facial part. Follow the directions given auditorially as each body part is selected.

Suggested opening script for "Body.boy or Body.girl"

Today we are going to learn about the parts of our body.
We are going to use a computer and the mouse to learn more about the parts of our body.
Can anyone name a part of their body?
Would anyone like to use the mouse and point to the {body part} on the boy/girl? [repeat]

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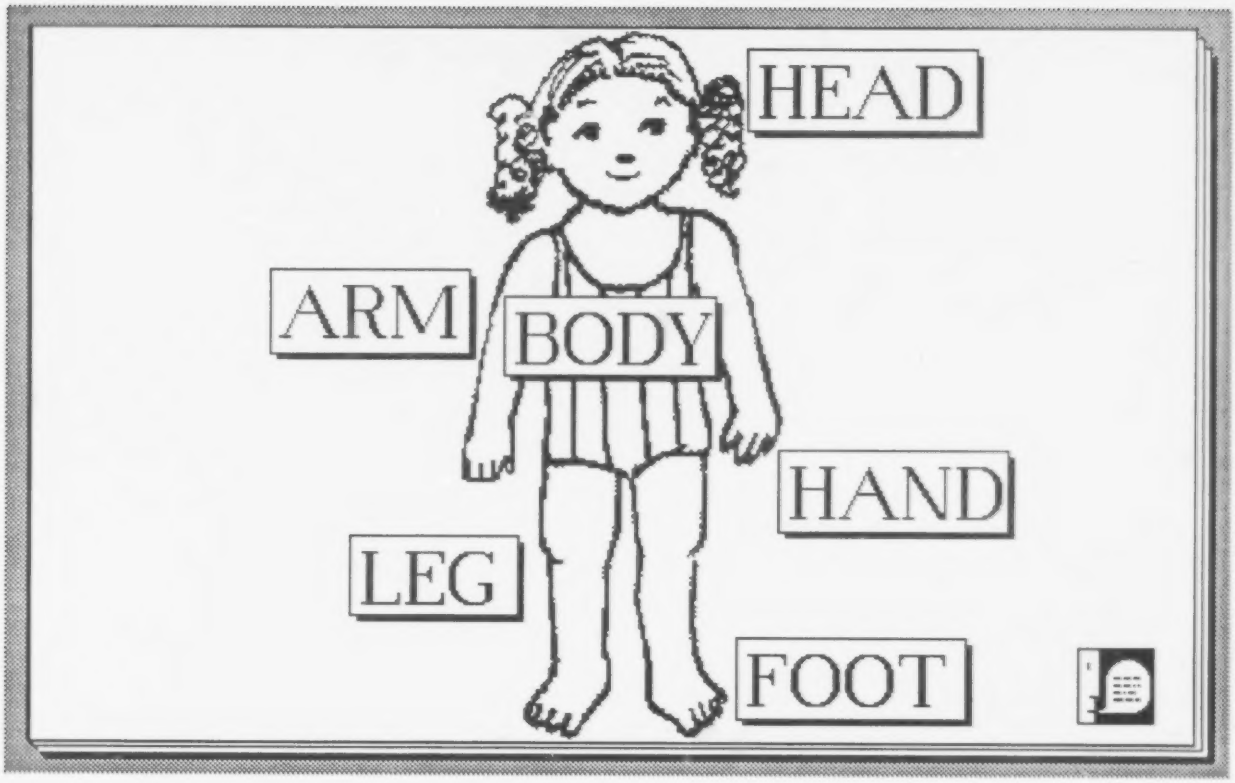

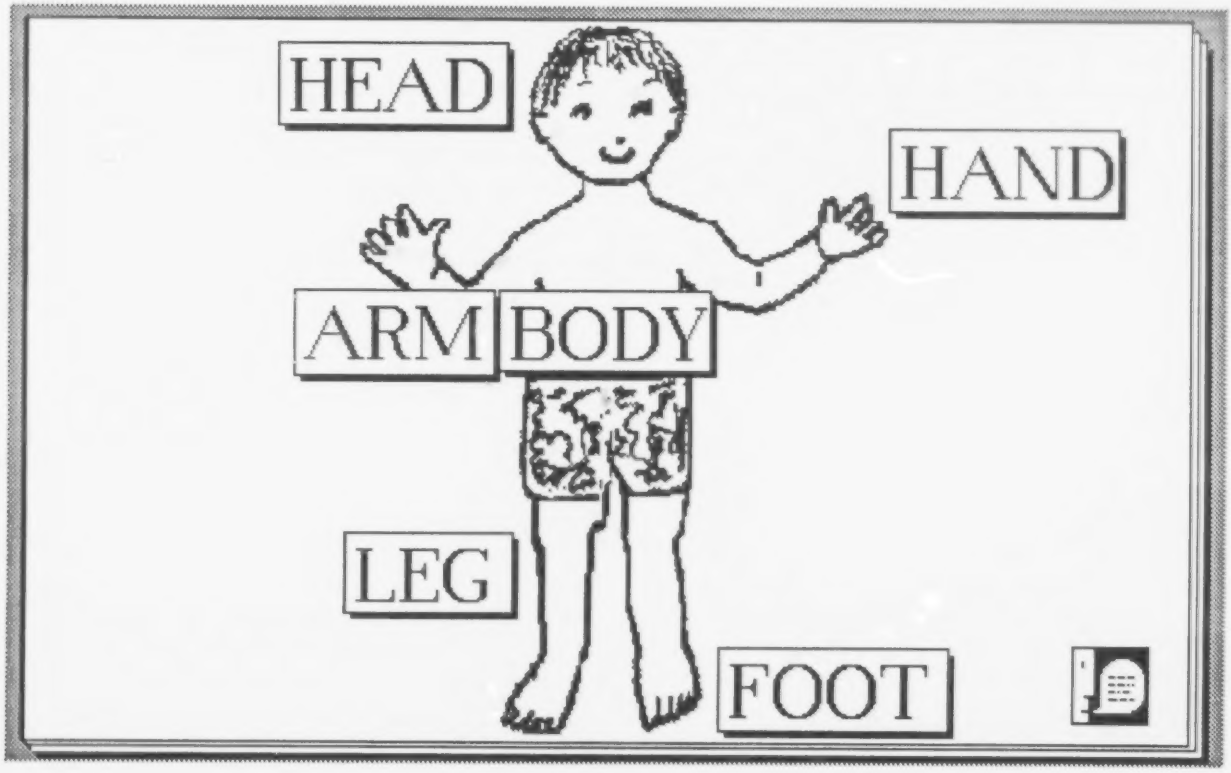

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Using MacMouse "CLOTHES"

CLOTHES was designed to teach the awareness of the clothes we wear. By pointing with the mouse and selecting an article of clothing the computer presents, both visually and auditorially, the word associated with that article of clothing. Follow the directions given auditorially as each article of clothing is selected.

Suggested opening script for "CLOTHES"

Today we are going to learn about the names of our clothes.
We are going to use a computer and the mouse to learn more about the names of our clothes.
Can anyone tell me a name of something we are wearing?
Would anyone like to use the mouse and point to the (piece of clothing) on the boy/girl? [repeat]

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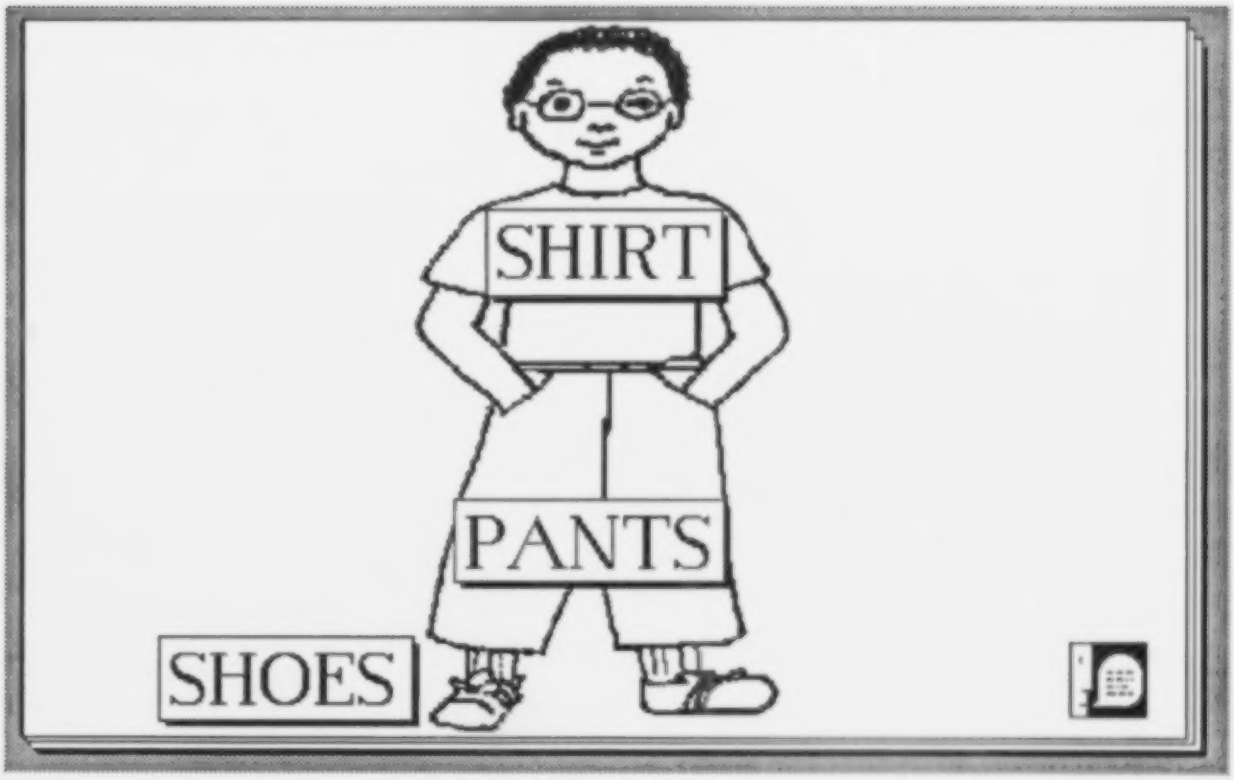
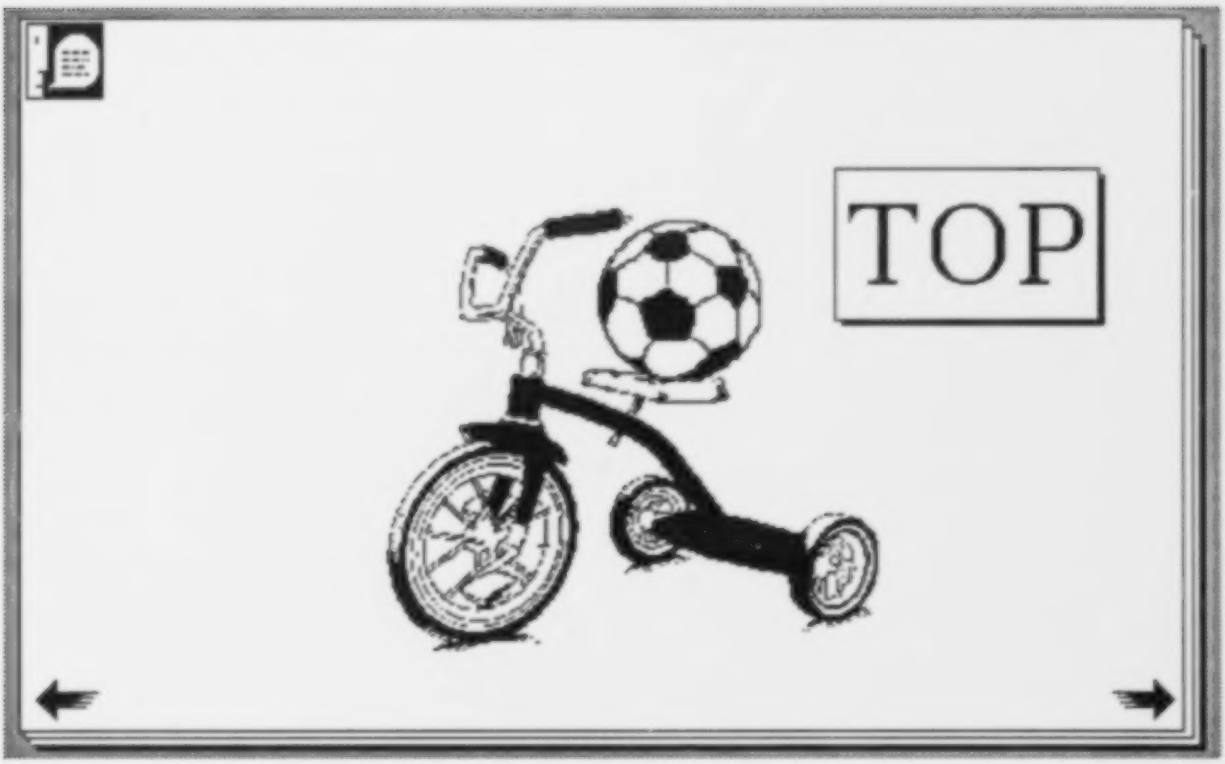


Using MacMouse "CONCEPTS"

CONCEPTS were designed to teach basic concepts from the Boehm Test of Basic Concepts. By pointing with the mouse at the ball on each card the computer presents, both visually and auditorially, the word associated with that basic concepts. Follow the directions given auditorially as each basic concepts is selected.

Suggested opening script for "CONCEPTS"

Today we are going to learn about where we can put a ball.
We are going to use a computer and the mouse to learn more about where ball can be.
Would anyone like to use the mouse and point at the ball on the screen? Now, click the mouse button. [repeat]



Curriculum Considerations

1. Children should possess generalized concepts and skills before successful use of the technology can occur.

2. Children should have developed sufficient curiosity of their surroundings to explore new environmental events.

3. Cause/effect and means/ends relationships should exist.

4. Another important skill for interaction with technology to exist is "Turn Taking".

5. Children should be functioning at a level where impulsive behavior is under control.

6. The ability of the children to follow specific steps and wait as the technology processes their input is a prerequisite for success.

7. To ensure early success, tasks should be presented in hierarchy of difficulty and clearly presented to eliminate needless and extraneous stimuli.

8. Tasks should be grouped, parallel to and reinforce concepts currently being taught.

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9. Children who experience many different kinds of sensory and physical impairments can benefit from technology instructionally designed for use in early childhood handicapped programs.

10. Children who have difficulty with expressive language but possess good receptive language, flourish when given an opportunity to successfully display thoughts and ideas they have previously been unable to communicate.

11. Earily childhood readiness concepts, skills and behaviors can be successfully taught using will designed instructional technologies.

The following are suggestions for content to be developed:

A. Following Verbal Directions

Boehm Concepts

on the chair	by the chair
in the box	in the front
under the	
below	behind
above	beside

B. Picture Vocabulary

Point to (click on) when voice names.....

dog	girl	apple boy	pencil
cat	man	leaf	car wagon
key	airplane	cup	nail
sock	hammer	fish	duck

C. Matches Design Concepts

Circle	square
triangle	diamond
rectangle	

D. Quantitative Concepts (opposites)

Little/big	tall/short	few/many
short/long	slow/fast	empty/full
thin/fat	thick/thin	light/head
less/more	narrow/wide	shallow/deep

E. Directional/Positional Concepts (opposites)

up/down	out/in	far/near
over/under	bottom/top	go/stop
low/high	off/on	

F. Classification

toys
writing instruments
numbers
clothes
colors
foods
furniture
fruit
vegetables
people
things to read
animals (zoo, farm, pets)
things to ride
tools
dishes
designs
musical instruments

G. General Knowledge and Comprehension

What do you do when you ....

are hungry
are sleepy
are cold
are cut
are sick
are dirty
are in a dark room
are getting wet
see your shoes are untied
want to go outside
see a fire
see it is raining

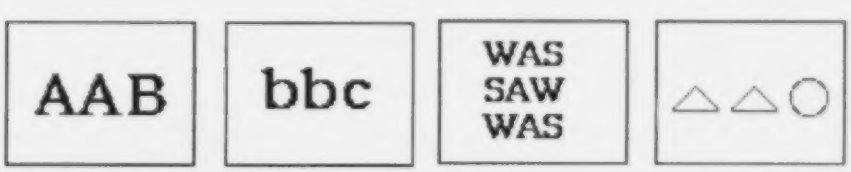
H. Use of Objects

Why do we have .....

beds
chairs
lights
dishes
houses
telephones
coats
stores
books
pans

I. Visual Discrimination

Discriminates between two like or different symbols such as:



Matches upper and lower case letters

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L. Jeffrey Fitterman, Ed.S.
Instructional Technology Specialist
Florida Diagnostic and Learning
Resources System
411 East Henderson, Room 105
Tampa, Florida 33602

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